



Product Service

ATTESTATION OF CONFORMITY

Client: Huawei Technologies Co., Ltd
Administration Building Headquarters
of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, 518129
Shenzhen, PEOPLE'S REPUBLIC OF
CHINA

Manufacturing place: 1) Huawei Machine Co., Ltd.
No. 2 City Avenue, Songshan Lake Sci.
& Tech. Industry Park, 523808
Dongguan, Guangdong, PEOPLE'S
REPUBLIC OF CHINA
2) Shenzhen Fugui Precision Industry
Co., LTD
Floor 1~4, Building 1, F8d District,
Foxconn Science and Technology
Industrial Park, East side of Min Qing
Road, Longhua Subdistrict, Longhua
District, 518109, Shenzhen,
Guangdong, PEOPLE'S REPUBLIC
OF CHINA

Test subject: SOLAR INVERTER
Type: SUN2000-50KTL-M0,
SUN2000-60KTL-M0, SUN2000-
65KTL-M0, SUN2000-70KTL-INM0

Test specification: EN 50530:2010/A1:2013
Overall efficiency of grid connected
photovoltaic inverters

Purpose of examination: Test according to the test specification

Test result: The test results show that the
presented product is tested according
to procedure for measuring efficiency
of specified standard above(see
attachment for detail efficiency
measurement result)

Test report No. 70.409.18.051.17-00

Date, 2018-04-12


(Zhengdong Ma)

This Verification may only be quoted in full. Any use for advertising purposes must be granted in writing. This Verification is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production. This Verification is part of the full test report(s) and should be read in conjunction with it.



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Measuring of efficiency

Extract from test report:

No. 70.409.18.051.17-00

Static MPPT Efficiency - SUN2000-50KTL-M0@3/N/PE~, 230/400V

Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (800V)	U _{DC,r} (600V)	U _{MPPmin} (520V)	U _{MPPmax} * (770V)	U _{DC,r} (600V)	U _{MPPmin} (520V)
P/P _n						
5%	99,29	99,94	99,95	99,94	99,94	99,95
10%	99,96	99,98	99,96	99,97	99,98	99,96
20%	99,97	99,99	99,98	99,99	99,99	99,98
25%	99,96	99,99	99,98	99,98	99,99	99,98
30%	99,97	99,98	99,98	99,96	99,98	99,98
50%	99,98	99,98	99,99	99,99	99,98	99,99
75%	99,99	99,99	99,98	99,99	99,99	99,98
100%	99,98	99,99	99,93	99,95	99,99	99,93

Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.

Static MPPT Efficiency:

$$\eta_{MPPT_{stat}} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$$

Conversion Efficiency - SUN2000-50KTL-M0@3/N/PE~, 230/400V

Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (800V)	U _{DC,r} (600V)	U _{MPPmin} (520V)	U _{MPPmax} * (770V)	U _{DC,r} (600V)	U _{MPPmin} (520V)
P/P _n						
5%	96,03	96,92	96,01	96,50	96,92	96,01
10%	97,60	98,02	97,22	97,85	98,02	97,22
20%	98,30	98,56	97,80	98,37	98,56	97,80
25%	98,39	98,60	97,95	98,41	98,60	97,95
30%	98,45	98,67	98,12	98,45	98,67	98,12
50%	98,52	98,72	98,26	98,46	98,72	98,26
75%	98,44	98,65	98,22	98,33	98,65	98,22



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100%	98,32	98,55	98,13	98,17	98,55	98,13
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Note: * The value of U_{MPPmax} or $0,8 \cdot U_{DCmax}(cSi)/0,7 \cdot U_{DCmax}(TF)$, whichever is lower shall be used.

Static Power Conversion Efficiency:

$$\eta_{conv} = \frac{\int_0^{T_{dt}} p_{AC}(t) \cdot dt}{\int_0^{T_{dt}} p_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 98,72% at $U_{DC,r}(600VDC)$ with 50% rated output power.

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-50KTL-M0@3/N/PE~, 230/400V							
Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}^* (800V)	99,96	99,98	98,31	98,41	98,27	98,39
	$U_{DC,r}$ (600V)	99,98	99,99	98,56	98,63	98,55	98,62
	U_{MPPmin} (520V)	99,97	99,98	98,03	98,15	98,00	98,13
TF	U_{MPPmax}^* (770V)	99,98	99,98	98,29	98,35	98,27	98,33
	$U_{DC,r}$ (600V)	99,98	99,99	98,56	98,63	98,55	98,62
	U_{MPPmin} (520V)	99,97	99,98	98,03	98,15	98,00	98,13

Note: * The value of U_{MPPmax} or $0,8 \cdot U_{DCmax}(cSi)/0,7 \cdot U_{DCmax}(TF)$, whichever is lower shall be used.

Dynamic MPPT Efficiency - SUN2000-50KTL-M0@3/N/PE~, 230/400V						
Dynamic MPPT-Test 10 % $\Rightarrow$ 50 % G_{STC}						
Number	Slope $W/m^2/s$	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,96
3	2	200	10	200	10	99,96
4	3	133	10	133	10	99,95
6	5	80	10	80	10	99,94
8	7	57	10	57	10	99,88
10	10	40	10	40	10	99,87
10	14	29	10	29	10	99,85
10	20	20	10	20	10	99,80
10	30	13	10	13	10	99,66

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10	50	8	10	8	10	99,55
Overall Dynamic MPPT Efficiency						99,85
Dynamic MPPT-Test 30 % $\Rightarrow$ 100 %G_{STC}						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,96
10	14	50	10	50	10	99,92
10	20	35	10	35	10	99,91
10	30	23	10	23	10	99,90
10	50	14	10	14	10	99,87
10	100	7	10	7	10	99,92
Overall Dynamic MPPT Efficiency						99,91
Start-up and shut-down						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,90
Overall Dynamic MPPT Efficiency						99,90

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Static MPPT Efficiency - SUN2000-60KTL-M0@3/N/PE~, 230/400V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (800V)	U _{DC,r} (600V)	U _{MPPmin} (520V)	U _{MPPmax} * (770V)	U _{DC,r} (600V)	U _{MPPmin} (520V)
P/P _n						
5%	99,99	99,88	99,98	99,94	99,88	99,98
10%	99,99	99,97	99,99	99,97	99,97	99,99
20%	99,99	99,98	99,99	99,99	99,98	99,99
25%	99,99	99,99	99,99	99,98	99,99	99,99
30%	99,99	99,99	99,99	99,96	99,99	99,99
50%	99,99	99,99	99,99	99,99	99,99	99,99
75%	99,99	99,97	99,99	99,99	99,97	99,99
100%	99,99	99,98	99,99	99,95	99,98	99,99
Note: * The value of U _{MPPmax} or 0,8*U _{DCmax} (cSi)/0,7*U _{DCmax} (TF), whichever is lower shall be used. $\eta_{MPPT,stat} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$						
Static MPPT Efficiency						

Conversion Efficiency - SUN2000-60KTL-M0@3/N/PE~, 230/400V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (800V)	U _{DC,r} (600V)	U _{MPPmin} (520V)	U _{MPPmax} * (770V)	U _{DC,r} (600V)	U _{MPPmin} (520V)
P/P _n						
5%	96,37	97,25	96,04	96,50	97,25	96,04
10%	97,75	98,21	97,31	97,85	98,21	97,31
20%	98,31	98,59	97,91	98,37	98,59	97,91
25%	98,41	98,66	98,04	98,41	98,66	98,04
30%	98,46	98,71	98,09	98,45	98,71	98,09
50%	98,47	98,68	98,05	98,46	98,68	98,05
75%	98,28	98,57	97,84	98,33	98,57	97,84
100%	98,12	98,44	97,90	98,17	98,44	97,90
Note: * The value of U _{MPPmax} or 0,8*U _{DCmax} (cSi)/0,7*U _{DCmax} (TF), whichever is lower shall be used. Static Power Conversion Efficiency:						



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$$\eta_{conv} = \frac{\int_0^{T_{dt}} P_{AC}(t) \cdot dt}{\int_0^{T_{dt}} P_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 98,71% at $U_{DC,r}(600VDC)$ with 30% of rated output power.

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-60KTL-M0@3/N/PE~, 230/400V

Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}^* (800V)	99,99	99,99	98,27	98,31	98,26	98,30
	$U_{DC,r}$ (600V)	99,98	99,98	98,55	98,59	98,53	98,57
	U_{MPPmin} (520V)	99,99	99,99	97,90	97,90	97,89	97,89
TF	U_{MPPmax}^* (770V)	99,98	99,98	98,29	98,35	98,27	98,33
	$U_{DC,r}$ (600V)	99,98	99,98	98,55	98,59	98,53	98,57
	U_{MPPmin} (520V)	99,99	99,99	97,90	97,90	97,89	97,89

Note: * The value of U_{MPPmax} or $0,8 \cdot U_{DCmax}(cSi)/0,7 \cdot U_{DCmax}(TF)$, whichever is lower shall be used.

Dynamic MPPT Efficiency - SUN2000-60KTL-M0@3/N/PE~, 230/400V

Dynamic MPPT-Test 10 % $\Rightarrow$ 50 % G_{STC}

Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,97
3	2	200	10	200	10	99,96
4	3	133	10	133	10	99,93
6	5	80	10	80	10	99,94
8	7	57	10	57	10	99,88
10	10	40	10	40	10	99,89
10	14	29	10	29	10	99,86
10	20	20	10	20	10	99,79
10	30	13	10	13	10	99,79
10	50	8	10	8	10	99,61
Overall dynamic MPPT efficiency						99,87

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Dynamic MPPT-Test 30 % $\Rightarrow$ 100 %G _{STC}						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,95
10	14	50	10	50	10	99,90
10	20	35	10	35	10	99,92
10	30	23	10	23	10	99,86
10	50	14	10	14	10	99,88
10	100	7	10	7	10	99,89
Overall dynamic MPPT efficiency						99,90
Start-up and shut-down						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,91
Overall dynamic MPPT efficiency						99,91

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Static MPPT Efficiency - SUN2000-60KTL-M0@3~, 480V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (850V)	U _{DC,r} (720V)	U _{MPPmin} (600V)	U _{MPPmax} * (770V)	U _{DC,r} (720V)	U _{MPPmin} (600V)
P/P _n						
5%	99,32	99,97	99,94	99,98	99,97	99,94
10%	99,99	99,98	99,98	99,98	99,98	99,98
20%	99,99	99,98	99,97	99,99	99,98	99,97
25%	99,98	99,99	99,95	99,99	99,99	99,95
30%	99,97	99,99	99,98	99,98	99,99	99,98
50%	99,98	99,98	99,98	99,99	99,98	99,98
75%	99,99	99,99	99,97	99,98	99,99	99,97
100%	99,99	99,98	99,98	99,98	99,98	99,98
Note: * The value of U _{MPPmax} or 0,8*U _{DCmax} (cSi)/0,7*U _{DCmax} (TF), whichever is lower shall be used.						
$\eta_{MPPTstat} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$						
Static MPPT Efficiency						

Conversion Efficiency - SUN2000-60KTL-M0@3~, 480V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (850V)	U _{DC,r} (720V)	U _{MPPmin} (600V)	U _{MPPmax} * (770V)	U _{DC,r} (720V)	U _{MPPmin} (600V)
P/P _n						
5%	96,12	97,00	95,62	96,42	97,00	95,62
10%	97,75	98,18	97,00	97,86	98,18	97,00
20%	98,47	98,72	97,64	98,56	98,72	97,64
25%	98,54	98,78	97,80	98,66	98,78	97,80
30%	98,59	98,83	97,92	98,71	98,83	97,92
50%	98,66	98,90	98,15	98,80	98,90	98,15
75%	98,60	98,80	98,16	98,74	98,80	98,16
100%	98,49	98,75	98,09	98,66	98,75	98,09
Note: * The value of U _{MPPmax} or 0,8*U _{DCmax} (cSi)/0,7*U _{DCmax} (TF), whichever is lower shall be used.						
Static Power Conversion Efficiency:						



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$$\eta_{conv} = \frac{\int_0^{T_{th}} P_{AC}(t) \cdot dt}{\int_0^{T_{th}} P_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 98,90% at $U_{DC,r}(720VDC)$ with 50% of rated output power

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-60KTL-M0@3~, 480V

Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}^* (850V)	99,96	99,99	98,46	98,57	98,43	98,55
	$U_{DC,r}$ (720V)	99,98	99,99	98,74	98,79	98,72	98,78
	U_{MPPmin} (600V)	99,98	99,97	97,90	98,05	97,88	98,03
TF	U_{MPPmax}^* (770V)	99,99	99,98	98,60	98,70	98,59	98,68
	$U_{DC,r}$ (720V)	99,98	99,99	98,74	98,79	98,72	98,78
	U_{MPPmin} (600V)	99,98	99,97	97,90	98,05	97,88	98,03

Note: * The value of U_{MPPmax} or $0,8 \cdot U_{DCmax}(cSi)/0,7 \cdot U_{DCmax}(TF)$, whichever is lower shall be used.

Dynamic MPPT Efficiency - SUN2000-60KTL-M0@3~, 480V

Dynamic MPPT-Test 10 % $\Rightarrow$ 50 % G_{STC}

Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,97
3	2	200	10	200	10	99,90
4	3	133	10	133	10	99,93
6	5	80	10	80	10	99,90
8	7	57	10	57	10	99,80
10	10	40	10	40	10	99,85
10	14	29	10	29	10	99,83
10	20	20	10	20	10	99,76
10	30	13	10	13	10	99,52
10	50	8	10	8	10	99,67
Overall dynamic MPPT efficiency						99,83

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Dynamic MPPT-Test 30 % $\Rightarrow$ 100 %G _{STC}						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,95
10	14	50	10	50	10	99,93
10	20	35	10	35	10	99,91
10	30	23	10	23	10	99,95
10	50	14	10	14	10	99,91
10	100	7	10	7	10	99,88
Overall dynamic MPPT efficiency						99,92
Start-up and shut-down						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,89
Overall dynamic MPPT efficiency						99,89

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Static MPPT Efficiency - SUN2000-65KTL-M0@3~, 480V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (850V)	U _{DC,r} (720V)	U _{MPPmin} (600V)	U _{MPPmax} * (770V)	U _{DC,r} (720V)	U _{MPPmin} (600V)
P/P _n						
5%	99,72	99,91	99,92	99,91	99,91	99,92
10%	99,98	99,97	99,99	99,99	99,97	99,99
20%	99,97	99,98	99,93	99,96	99,98	99,93
25%	99,98	99,99	99,98	99,97	99,99	99,98
30%	99,99	99,98	99,93	99,99	99,98	99,93
50%	99,99	99,99	99,99	99,98	99,99	99,99
75%	99,98	99,98	99,99	99,95	99,98	99,99
100%	99,99	99,99	99,99	99,99	99,99	99,99
Note: * The value of U _{MPPmax} or 0,8*U _{DCmax} (cSi)/0,7*U _{DCmax} (TF), whichever is lower shall be used.						
$\eta_{MPPTstat} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$						
Static MPPT Efficiency						

Conversion Efficiency - SUN2000-65KTL-M0@3~, 480V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (850V)	U _{DC,r} (720V)	U _{MPPmin} (600V)	U _{MPPmax} * (770V)	U _{DC,r} (720V)	U _{MPPmin} (600V)
P/P _n						
5%	96,65	97,50	96,11	97,06	97,50	96,11
10%	97,96	98,44	97,13	98,15	98,44	97,13
20%	98,57	98,80	97,81	98,61	98,80	97,81
25%	98,64	98,84	97,88	98,70	98,84	97,88
30%	98,67	98,86	98,04	98,71	98,86	98,04
46%	-	98,91	-	-	98,91	-
50%	98,70	98,88	98,18	98,71	98,88	98,18
75%	98,64	98,79	98,16	98,61	98,79	98,16
100%	98,59	98,74	98,04	98,49	98,74	98,04
Note: * The value of U _{MPPmax} or 0,8*U _{DCmax} (cSi)/0,7*U _{DCmax} (TF), whichever is lower shall be used.						
Static Power Conversion Efficiency:						

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$$\eta_{conv} = \frac{\int_0^{T_d} p_{AC}(t) \cdot dt}{\int_0^{T_d} p_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 98,91% at $U_{DC,r}(720VDC)$ with 46% of rated output power

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-65KTL-M0@3~, 480V

Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}^* (850V)	99,98	99,98	98,55	98,62	98,53	98,61
	$U_{DC,r}$ (720V)	99,98	99,98	98,77	98,80	98,76	98,78
	U_{MPPmin} (600V)	99,97	99,98	97,96	98,09	97,94	98,07
TF	U_{MPPmax}^* (770V)	99,98	99,97	98,57	98,62	98,55	98,58
	$U_{DC,r}$ (720V)	99,98	99,98	98,77	98,80	98,76	98,78
	U_{MPPmin} (600V)	99,97	99,98	97,96	98,09	97,94	98,07

Note: * The value of U_{MPPmax} or $0,8 \cdot U_{DCmax}(cSi)/0,7 \cdot U_{DCmax}(TF)$, whichever is lower shall be used.

Dynamic MPPT Efficiency - SUN2000-65KTL-M0@3~, 480V

Dynamic MPPT-Test 10 % $\Rightarrow$ 50 % G_{STC}

Number	Slope $W/m^2/s$	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,97
3	2	200	10	200	10	99,95
4	3	133	10	133	10	99,97
6	5	80	10	80	10	99,94
8	7	57	10	57	10	99,92
10	10	40	10	40	10	99,86
10	14	29	10	29	10	99,79
10	20	20	10	20	10	99,77
10	30	13	10	13	10	99,82
10	50	8	10	8	10	99,70
Overall dynamic MPPT efficiency						99,88

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Dynamic MPPT-Test 30 % $\Rightarrow$ 100 % G_{STC}						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,96
10	14	50	10	50	10	99,91
10	20	35	10	35	10	99,92
10	30	23	10	23	10	99,85
10	50	14	10	14	10	99,88
10	100	7	10	7	10	99,92
Overall dynamic MPPT efficiency						99,91
Start-up and shut-down						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,92
Overall dynamic MPPT efficiency						99,92



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Static MPPT Efficiency - SUN2000-70KTL-INM0@3~, 500V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (850V)	U _{DC,r} (750V)	U _{MPPmin} (625V)	U _{MPPmax} * (770V)	U _{DC,r} (750V)	U _{MPPmin} (625V)
P/P _n						
5%	99,93	99,87	99,97	99,82	99,87	99,97
10%	99,97	99,98	99,99	99,99	99,98	99,99
20%	99,99	99,98	99,98	99,97	99,98	99,98
25%	99,96	99,99	99,99	99,98	99,99	99,99
30%	99,97	99,99	99,96	99,98	99,99	99,96
50%	99,99	99,98	99,99	99,99	99,98	99,99
75%	99,99	99,99	99,98	99,91	99,99	99,98
100%	99,99	99,99	99,91	99,99	99,99	99,91
Note: * The value of U _{MPPmax} or 0,8*U _{DCmax} (cSi)/0,7*U _{DCmax} (TF), whichever is lower shall be used.						
$\eta_{MPPT,stat} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$						
Static MPPT Efficiency						

Conversion Efficiency - SUN2000-70KTL-INM0@3~, 500V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U _{MPPmax} * (850V)	U _{DC,r} (750V)	U _{MPPmin} (625V)	U _{MPPmax} * (770V)	U _{DC,r} (750V)	U _{MPPmin} (625V)
P/P _n						
5%	96,28	97,07	95,77	97,22	97,07	95,77
10%	97,82	98,25	97,10	98,27	98,25	97,10
20%	98,50	98,73	97,72	98,69	98,73	97,72
25%	98,65	98,80	97,93	98,76	98,80	97,93
30%	98,70	98,84	98,03	98,79	98,84	98,03
37,5%	-	99,00	-	-	99,00	-
50%	98,78	98,89	98,20	98,80	98,89	98,20
75%	98,72	98,84	98,20	98,71	98,84	98,20
100%	98,64	98,78	98,13	98,59	98,78	98,13
Note: * The value of U _{MPPmax} or 0,8*U _{DCmax} (cSi)/0,7*U _{DCmax} (TF), whichever is lower shall be used.						
Static Power Conversion Efficiency:						

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$$\eta_{conv} = \frac{\int_0^{T_{dt}} P_{AC}(t) \cdot dt}{\int_0^{T_{dt}} P_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 99,00% at $U_{DC,r}(750VDC)$ with 46% of rated output power

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-65KTL-M0@3~, 480V

Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}^* (850V)	99,99	99,99	98,58	98,68	98,56	98,67
	$U_{DC,r}$ (750V)	99,98	99,99	98,75	98,82	98,73	98,81
	U_{MPPmin} (625V)	99,97	99,98	97,97	98,11	97,94	98,09
TF	U_{MPPmax}^* (770V)	99,98	99,95	98,66	98,71	98,65	98,66
	$U_{DC,r}$ (750V)	99,98	99,99	98,75	98,82	98,73	98,81
	U_{MPPmin} (625V)	99,97	99,98	97,97	98,11	97,94	98,09

Note: * The value of U_{MPPmax} or $0,8 \cdot U_{DCmax}(cSi)/0,7 \cdot U_{DCmax}(TF)$, whichever is lower shall be used.

Dynamic MPPT Efficiency - SUN2000-70KTL-INM0@3~, 500V

Dynamic MPPT-Test 10 % $\Rightarrow$ 50 % G_{STC}

Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,97
3	2	200	10	200	10	99,97
4	3	133	10	133	10	99,95
6	5	80	10	80	10	99,94
8	7	57	10	57	10	99,92
10	10	40	10	40	10	99,89
10	14	29	10	29	10	99,83
10	20	20	10	20	10	99,72
10	30	13	10	13	10	99,52
10	50	8	10	8	10	99,58
Overall dynamic MPPT efficiency						99,84

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Dynamic MPPT-Test 30 % $\Rightarrow$ 100 %G _{STC}						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,96
10	14	50	10	50	10	99,93
10	20	35	10	35	10	99,94
10	30	23	10	23	10	99,92
10	50	14	10	14	10	99,90
10	100	7	10	7	10	99,87
Overall dynamic MPPT efficiency						99,92
Start-up and shut-down						
Number	Slope W/m ² /s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,91
Overall dynamic MPPT efficiency						99,91